User Manual

Flatpack 1U Power Shelf with Rear Covers

Consists of:
Flatpack 1U PR Nortel Critical Connections Guide (B - 1503418 - 1)
Operation Guide 1.5mm FP PR w-covers (B - IM505393 - 1)

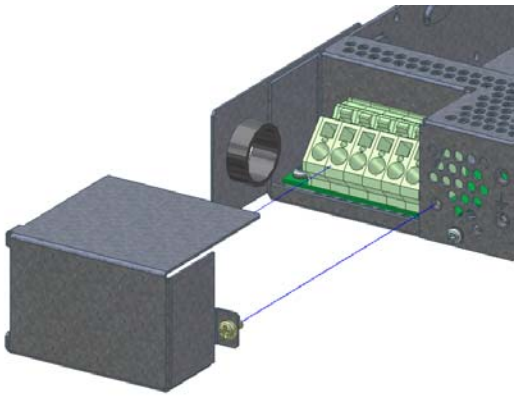
Eltek

IM505394
Issue 1
August 2004

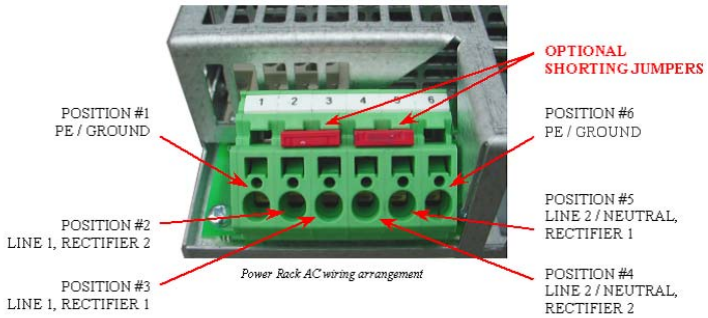
Flatpack Installation / Operation
Critical Connections Guide
1U Power Rack (Nortel)

This Guide is intended as supplemental documentation, always refer to the full System Installation and Operation Guides for detailed startup information

AC Input Termination Points
AC Cover Removal



Rear of Rectifier Mounting Shelf


OPTIONAL SHORTING JUMPERS
POSITION #1 PE / GROUND
POSITION #6 PE / GROUND
POSITION #5 LINE 2 / NEUTRAL, RECTIFIER 1
POSITION #2 LINE 1, RECTIFIER 2
POSITION #3 LINE 1, RECTIFIER 1
POSITION #4 LINE 2 / NEUTRAL, RECTIFIER 2

Power Rack AC wiring arrangement

Note that Rectifier 1 is on the left side as viewed from the front of the system.

Important!
Before installing rectifiers:

AC Input Voltage Requirements

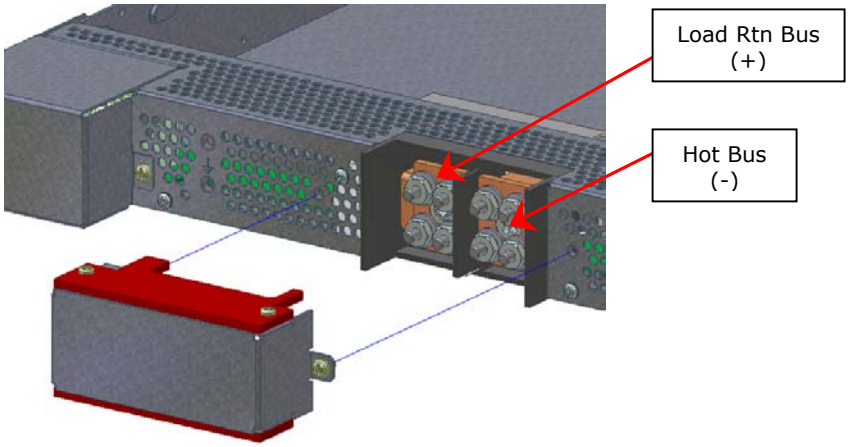
The Flatpack rectifier will operate from 85 – 310 VAC. The output power of the rectifier is dependant on the AC input range. 120 VAC nominal will produce 600W Maximum. 208 / 220 / 240 VAC nominal inputs will produce 1200 W Maximum.

AC Input Feed Sizing

AC Input- One Feed Per Shelf (2 rectifiers each shelf)				
Input VAC	**Max AC Amps**	**Feed Breaker**	**Wire Size**	**Output Watts**
120	11.6	15A	#14 AWG	1200 W
208	13.0	20A	#12 AWG	2400 W
220	12.0	15A	#14 AWG	2400 W
240	11.1	15A	#14 AWG	2400 W

DC Distribution Terminations

Termination Studs are 10-32; torque to 21-31 In-Lb.



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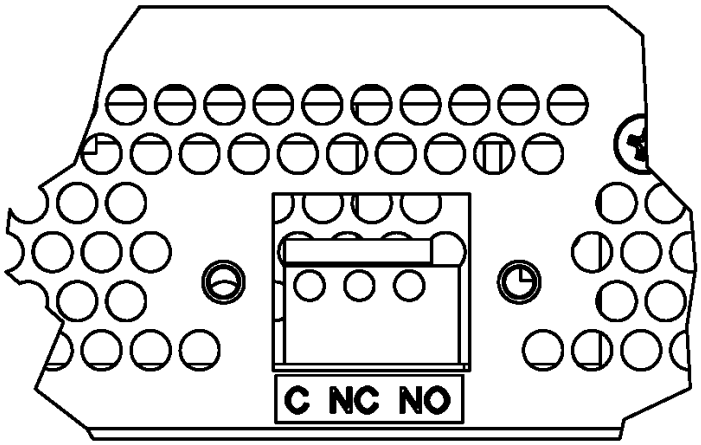
Alarm Output Terminations

Con3 – Con5: will accept wire #22 to #18 AWG
Form "C" Contacts Standard

For standalone applications, the power rack has an alarm relay output. This will allow the user to monitor the rectifier alarms without the addition of an MCU. A relay opening or closure can be used, depending on the application. The connection is made to a 3-position terminal block on the rear of the shelf.

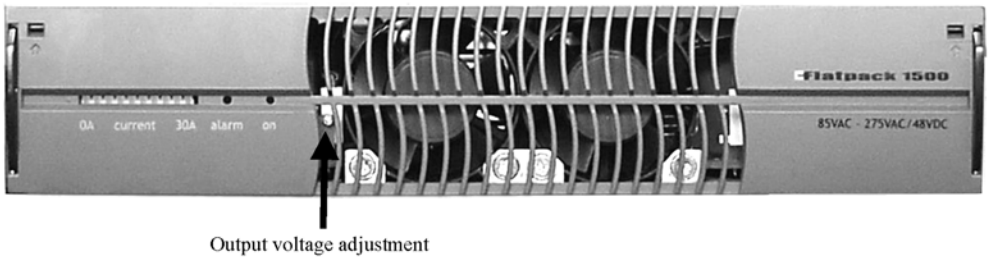


Basic Settings

Setting The System Output Voltage

The Flatpack 1500 has a front accessible potentiometer that can be used to adjust the output voltage of the rectifier.

If more than one rectifier is to be installed in the system, it is advisable to install and adjust each rectifier individually turn so that there is only one rectifier in the system at any one time, on completion all the rectifiers may then be installed.



Output voltage adjustment

- ✓ **This adjustment is normally set at the factory during testing. It is advisable to avoid making un-necessary re-adjustments, due account should be taken of the effect this procedure may have on the customers equipment.**

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1 Scope

This User Manual describes the Flatpack 1U power shelf with two Flatpack 1500 rectifiers installed. Each rectifier can supply 1400W of output power making the total power from the Flatpack 1U Power Shelf 2800W.

The Flatpack 1U Power Shelf is designed for mounting into 19" cabinets. It is supplied as a stand-alone unit and can be mounted into equipment. Extenders are supplied for installing the Flatpack 1U Power Shelf into ETSI racks or 23" racks.

This Operation Guide contains an overview of the power shelf and its connections, together with a description of it's installation and commissioning.

2 Installation Procedures

2.1 Safety Precautions

☑ **The equipment described in this manual must only be operated by Eltek Energy personnel or by persons who have attended a suitable Eltek Energy training course.**

☑ **The equipment represents an energy hazard and failure to observe this could cause terminal injury and invalidate our warranty.**

☑ **There are hazardous voltages inside the rectifier system. As the rectifier units incorporate large charged capacitors, it is dangerous to work inside the system even if the mains supply is disconnected.**

☑ **Please read the manual carefully before using the equipment.**

2.2 Mechanical Installation

Installation Step	Comments	Okay
1. TAKE THE FLATPACK POWER SHELF OUT OF THE PACKAGING	Inspect the power shelf for any physical damages. Damaged equipment should be returned to your supplier	
2. CHECK THAT THE MOUNTING ANGLES ON EACH SIDE ARE DIMENSIONED FOR YOUR	Mounting angles are included for mounting into 19", 21" & 600mm (ETSI) and 23" cabinets. The 19" brackets are factory installed. If the application requires	

SIZED CABINET	mounting other than 19", add the appropriate extender.	
3. INSTALL THE POWER SHELF INTO POSITION AND FASTEN TO THE RAIL	The power shelf is fixed with four screws, two on each side of the shelf	

Procedure 1: Mechanical Installation Flatpack 1U PR

2.3 Mains Connections

Note: All AC wiring must be enclosed in metallic conduit to meet UL and NEC requirements. One opening for ½" (trade size) conduit is present at the AC enclosure. The conduit fitting must be attached (fixed) to the AC input enclosure wall, through the opening provided.

Installation Step	Comments	Okay
1. VERIFY WHICH MAINS CONFIGURATION IS APPLICABLE FOR YOUR SYSTEM	Compare the description in the user manual with the jumper settings on the mains terminals. See Table 3 for details.	
2. IF NECESSARY, RECONFIGURE THE MAINS TERMINALS ACCORDING TO THE SUPPLY AVAILABLE	See Table 3 for details.	
3. INSTALL CONDUIT & WIRES	See Table 4 for wire sizing.	
4. CONNECT THE **PROTECTIVE EARTH** BEFORE ANY OF THE LIVE TERMINATIONS	**Connect AC safety ground (earth) conductor as identified by green or green/yellow insulation coloration.**	

Procedure 2: Mechanical Installation Flatpack 2U MCU panel

The table below indicates the maximum dimension of the mains wires. Use only copper wiring rated for operation to 90°C or higher (insulation temperature rating).

Wire Type	Maximum wire size (European/mm²)	Maximum wire size (US/AWG)
SOLID	6	10
MULTI-WIRE W/FERRULES	4	12

Table 1 - Wire sizes for mains connections

The mains terminals are placed in the back of the Power Shelf, on the left-hand side when seen from rear of the unit. To access the terminals, the AC cover must be removed, as shown in ***Figure 1***.

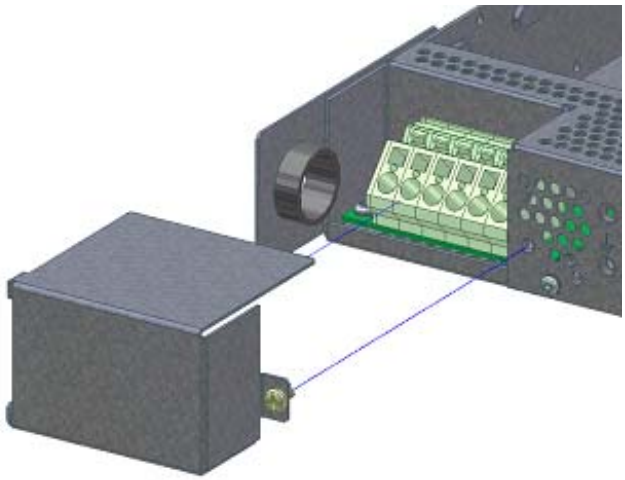


Figure 1 - AC Cover Removal

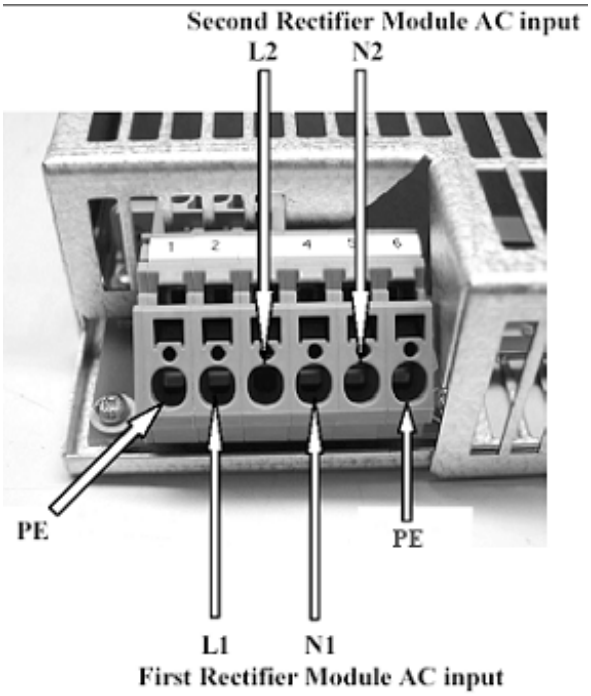


Figure 2 - Mains Connections - Flatpack Power Shelf

Connection number	1	2	3	4	5	6
Description	PE	L1	L2	N1	N2	PE

Table 2 - Pin configuration for mains connections

Mains Configuration	Description
SINGLE PHASE 120VAC, 208VAC, 230 VAC	Jumpers should be connected between pin 2 (L1) and pin 3 (L2), pin 4 (N1) and pin 5 (N2). Mains Wires to be connected to protective earth (PE), L1 and N1
SINGLE PHASE, DUAL INPUT	No jumpers required. Each rectifier is fed by separate mains feed. Feed 1 to be connected to L1, N1 and PE, feed 2 to be connected to L2, N2 and PE.
THREE PHASE 400 VAC WITH NEUTRAL	Jumpers required between pin 4 (N1) and pin 5 (N2). AC feed to be connected to L1, L2, N1 and PE. Note! Phase 3 wire (L3) will not be in use. The wire should be trimmed and insulated.
THREE PHASE 230 VAC DELTA	Jumpers required between pin 4 (N1) and pin 5 (N2). Mains wire L1 to be connected to pin 2 (L1), mains wire L2 to be connected to pin 4 (N1), mains wire L3 to be connected to pin 3 (L2) while PE is connected to pin 1 (PE)

Table 3 - Mains configuration for Flatpack Power Shelf

The AC mains input wiring must be protected by a readily accessible branch circuit protective device of the correct rating for the wire size (as determined by maximum AC input current). See Table 4.

Note: Wire sizing and fuse / breaker ratings are based on NEC requirements, at low AC mains line (10% below nominal). Wire sizes are for confined copper conductors in a 55°C maximum ambient temperature (per NEC Table 310-16). Branch protection is sized for ≥125% of input current.

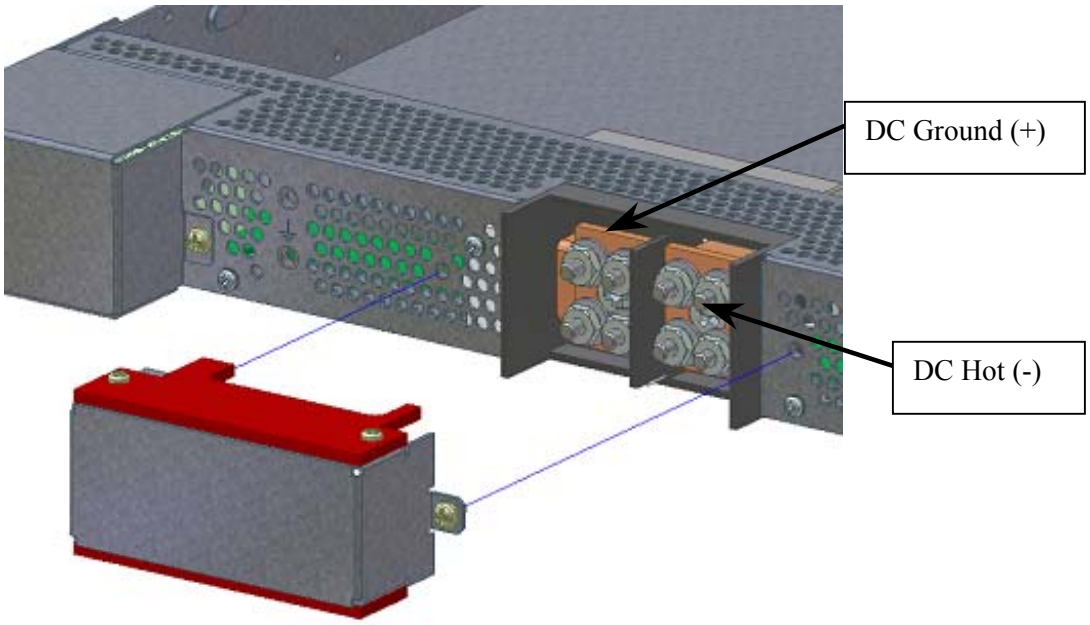
Input Feed Arrangement	Nominal AC Mains Input	Max. Input Current, A_{RMS}	Minimum Wire Size	Protective Element Minimum Rating, Amperes	Protective Element, Number of Poles/Positions per Feed
One Feed per Power Rack	SINGLE PHASE 120VAC	20	12AWG (4 mm²)	25	1
	SINGLE PHASE 208VAC	20	12AWG (4 mm²)	25	2
	SINGLE PHASE 230 / 240VAC	16	14AWG (2.5 mm²)	20	2
	THREE PHASE 400 VAC "WYE" (WITH NEUTRAL)				3
	THREE PHASE 230 VAC DELTA				3
One Feed per Rectifier	SINGLE PHASE 120VAC	10	16AWG (1.5 mm²)	15	1
	SINGLE PHASE 208VAC	10	16AWG (1.5 mm²)	15	2
	SINGLE PHASE 230 / 240VAC	8	16AWG (1.5 mm²)	10	2

Table 4 – AC Input wire sizes and fuse / breaker ratings

2.4 DC Connections

Installation Step	Comments	OK
1. DECIDE CABLE ENTRY	The cables can enter from the top and/or bottom.	
2. DRESS THE CABLES INTO THE CABINET, CUT TO LENGTH AND FIT CABLE LUGS	Use a cable cutter and cable lug crimper fitted with the appropriate size die. The studs on the bus connections are dimensioned for 2-hole lugs with 10-32 hardware. One- or two-hole lugs may be used.	
3. REMOVE THE DC COVERS	See Figure 3	
4. FASTEN THE CABLES TO THE DC TERMINALS		
5. FASTEN ALL CABLES TO CABLE SUPPORT RAILS AND CUT CABLE TIES FLUSH		
6. REPLACE DC COVERS		

Procedure 3 - DC connections



2.5 Alarm Connection

For standalone applications, the power rack has an alarm relay output. This will allow the user to monitor the rectifier alarms without the addition of an external controller. A relay opening or closure can be used, depending on the application. The connection is made to a 3-position terminal block on the rear of the shelf (see ***Figure 4***).

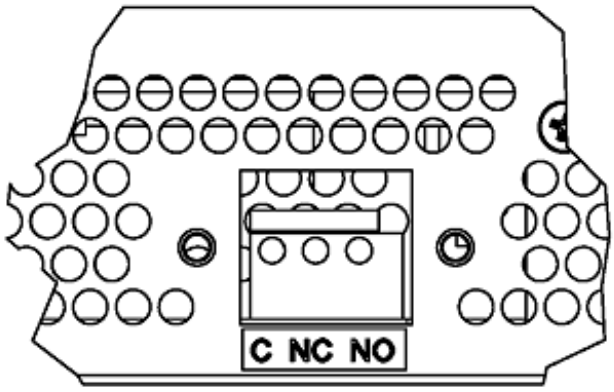


Figure 4 - Alarm output connection

2.5.1 Alarm conditions

The following table lists the rectifier failure alarms which can be monitored from the shelf alarm output connection:

Alarm condition	Explanation	Reset instructions
Low mains voltage	Input voltage drops below 85VAC	Auto-reset once input exceeds 85VAC
High mains voltage	Input voltage exceeds 312VAC	Auto-reset once input decreases below 312VAC
Input fuse protection	Blown input fuse due to over-current condition	Rectifier must be removed and fuse replaced
Fan failure	One or both fans have stopped or failed	Rectifier must be removed and fan(s) replaced
Internal rectifier failure	Component failure	Rectifier must be removed and returned for repair
Over-voltage shutdown	Output voltage above 59.5Vdc	Rectifier must be removed from the shelf and allowed to discharge for 1 minute. Re-install the rectifier. If an alarm is still present, the rectfier will have to be returned for repair.

Table 5 - Alarm conditions

2.6 Connections for Communication

The power shelf is fitted with a communication interface, which can be used to connect additional shelves for future expansion. As can be seen in ***Figure 5***, there are two RJ45 connectors. This allows daisy-chaining of multiple shelves.

Figure 5 - Communication Interface - Flatpack Power Shelf

3 System Operation

3.1 General

The Flatpack 1U Power Shelf is designed to incorporate two rectifiers Flatpack 1500. The Flatpack 1500 rectifier is a highly advanced rectifier designed for both stand-alone use and system operation. Several Flatpack 1U power shelves can easily be paralleled to obtain higher output power.

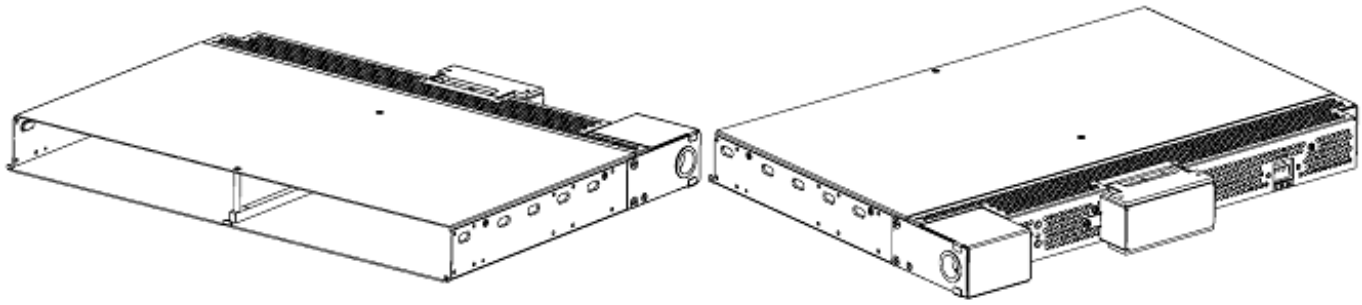
Refer to the Operation Guide for the Flatpack 1500 Rectifier Module for installation and operation instructions.

4 Mechanical Data

4.1 Mechanical Dimensions

DIMENSIONS	Width: 439mm (17.3”) Depth: 327mm (12.9”) Height: 43mm (1.7”)
WEIGHT	2.4 kg (5.3 lbs) 8.0 kg (17.6 lbs) with two Flatpack 1500 rectifiers installed

4.2 Mechanical Drawings



Drawing 1 - Flatpack 1U Power Shelf seen from the front and back

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